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CLAIMS

1. An air-incident optical recording medium having a recording layer sensitive to modulation and readout by an optical beam which can be used with a flying optical head, comprising:

a first dielectric layer disposed on the recording layer; and

a protective overcoat layer disposed on the first dielectric layer;

wherein at least one of the first dielectric layer and the protective overcoat layer have a low enough thermal conductivity that a surface temperature is maintained at a surface of the medium such that no significant physical evaporation of the protective overcoat layer or evaporation of adsorbed molecules from an ambient atmosphere occurs during read and write operations.

2. The optical disk of claim 1 where the first dielectric layer and the protective overcoat layer keep the surface temperature less than the desorption temperature of water during read and write operations.

3. The optical disk of claim 1 where the first dielectric layer and the protective overcoat layer keep the surface temperature less than the desorption temperature of common hydrocarbon species found in ambient air during read and write operations.

4. The optical disk of claim 1 where the protective overcoat layer comprises a solid-phase overcoat and a lubricant.

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5. The optical disk of claim 1 where the protective layer is a lubricant.

6. The optical disk of claim 1 where a third dielectric layer is added between the metal reflector layer and the substrate.

7. The optical disk of claim 1 where the recording layer is a metal alloy comprising elements chosen from the group including: Ge, Sb, Te, In, Ag.

8. The optical disk of claim 1 where the recording layer is a magneto-optical material exhibiting Kerr effect.

9. The optical disk of claim 1 where the protective overcoat layer has high thermal conductivity to dissipate heat that reaches the surface.

10. The optical disk of claim 1 where the separation between an upper surface of the recording layer and an upper surface of the overcoat layer is in the range of 100-500 nm.

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11. An air-incident optical disk having a phase change recording layer where the reflectivity difference between the amorphous and crystalline states are utilized for mark formation, the disk used with flying optical heads, comprising:

a first dielectric layer; and

a protective overcoat layer;

wherein when the phase change recording layer experiences a temperature sufficient to cause transformation to an amorphous state, a surface of the disk on which optical energy impinges experiences a temperature such that no significant evaporation of the protective overcoat layer and no significant evaporation of adsorbed molecules from ambient atmosphere occur.

12. The optical disk of claim 11 where the first dielectric layer and the protective overcoat layer keep the surface temperature less than the desorption temperature of water during read and write operations.

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13. The optical disk of claim 11 such that the protective ~~overcoat~~ layer has high thermal conductivity to dissipate ~~heat that~~ reaches the surface.

14. The optical disk of claim 11 where the first dielectric layer and the protective overcoat layer keep the surface temperature less than the desorption temperature of common hydrocarbon species found in ambient air during read and write operations.

15. The optical disk of claim 11 where the protective overcoat layer comprises a solid-phase overcoat and a lubricant.

16. The optical disk of claim 11 where the protective overcoat layer is a lubricant.

17. The optical disk of claim 11 where a third dielectric layer is added between the metal reflector layer and the substrate.

18. The optical disk of claim 11 where a thermal isolation layer having a thermal conductivity less than a thermal conductivity of the first dielectric layer is added between the protective overcoat and the first dielectric layer.

19. The optical disk of claim 11 where the separation between the recording layer and the overcoat layer is in the range of 100-500 nm.

20. The optical disk of claim 11 where the total optical thickness between the recording layer and the surface of the disk is greater than the optical thickness required to achieve the first maximum in reflectivity difference between the amorphous and the crystalline states of the phase change recording material.

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21. An optical recording system comprising of an air-incident optical disk compatible with flying optical heads, in which the recording layer is separated from a surface of the disk by intervening layers of a total thickness less than about 1 μm and a composition such that the highest temperature of the surface during normal operation is less than the desorption temperature of water;

a flying optical head where the lowest facet of the lens element of the flying optical head is supported to float in close proximity to the surface of the disk and where the optical focus of the flying head is at the recording layer;

means of delivering a beam of light to the optical head;

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means of optically detecting and differentiating the presence and absence of the mark as seen by the optical beam;

and tracking detection and feedback means to ensure that the optical beam can follow the path of the marks.

22. The system of claim 21 where the air-incident disk uses phase change recording layer.

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23. The system of claim 21 where the flying optical head comprise of a solid immersion lens element having a spherical surface and substantially flat surface facing the disk.

24. The system of claim 21 wherein flying optical head utilizes evanescent coupling effects to decrease the spot size of the optical beam at the recording layer.

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25. In an air-incident optical recording medium which can be used with a flying optical head, the recording medium including a recording layer sensitive to heat produced by an optical beam, a coating system less than 1 μm thick on the recording layer, between the recording layer and the flying optical head, the coating system having at least one layer whose thermal conductivity prevents a surface temperature from occurring when the recording layer is heated by the optical beam which can cause evaporation of molecules adsorbed therein from an ambient atmosphere.

26. The coating system of claim 25, further comprising plural layers, wherein evaporation of an outermost layer is prevented by the thermal conductivity of the at least one layer.

27. The coating system of claim 26, wherein the coating system comprises:

a dielectric overcoat layer; and

a protective overcoat layer.

28. The coating of claim 27, wherein the protective overcoat layer comprises a lubricant.

29. The coating of claim 28, wherein the protective overcoat further comprises a solid overcoat.

30. The coating of claim 27, wherein the dielectric overcoat layer is the at least one layer.

31. The coating of claim 30, wherein the protective overcoat layer has a thermal conductivity causing rapid dissipation of surface heat.